SUMMARY

Barrick Goldstrike Mines Inc. (Barrick) owns and operates the Goldstrike property, which is located in Elko and Eureka counties, Nevada, approximately 23 miles northwest of Carlin, Nevada. In 1989, Barrick submitted a Plan of Operations (Plan) to the Bureau of Land Management (BLM) for the Betze Project. As provided by the National Environmental Policy Act of 1969 as amended (NEPA), BLM prepared an environmental impact statement (EIS) with respect to Barrick's proposed Plan. The Final EIS (BLM 1991b) and Record of Decision (ROD) (BLM 1991d) for the Betze Project were issued on June 10, 1991. The Final EIS included a description of the environmental impacts projected to result from ground water pumping to be conducted by Barrick to lower the local ground water elevations below the proposed Betze mining operations.

In 1992, Barrick proposed to develop the Meikle Mine, an underground deposit located approximately 1 mile north of the Betze-Post Pit; the BLM prepared an environmental assessment (EA) for the Meikle Mine in May 1993 (BLM 1993a). The EA analyzed the potential impacts of dewatering this underground operation to the operation's ultimate depth of 3600 feet above mean sea level (amsl). In 1994, the BLM prepared a Biological Assessment (BA) of Barrick's Dewatering Operations (BLM 1994b), including both the Betze-Post Pit and the Meikle Mine. The BA analyzed dewatering to an elevation of 4160 feet amsl. Also in 1994, the U.S. Fish and Wildlife Service (USFWS) prepared a Biological Opinion (BO) (USFWS 1994), which concluded that Barrick's dewatering operations to an elevation of 4160 feet would not likely jeopardize the Lahontan cutthroat trout (LCT). The BLM ultimately approved the Meikle Mine dewatering program to an elevation of 4160 feet in the Finding of No Significant Impact and Decision Record (BLM 1994c).

Barrick has conducted ground water modeling and implemented ground water monitoring programs in association with all of these analyses. The monitoring data collected since 1989 have been used to continually update and refine Barrick's ground water model as the basis for the prediction of the depth and areal extent of the cone of depression associated with mine dewatering and water management activities. The results of the data collection programs and ground water analyses are described in this Supplemental EIS. A description of Barrick's ground water model is included in Appendix D.

Supplemental EIS

Since the Betze EIS was issued, Barrick's implementation of the ground water pumping and management operations and its monitoring of ground water elevations have provided new information regarding the pumping requirements and potential environmental impacts of Barrick's ground water pumping operations at the Goldstrike Mine, which includes the Betze-Post Pit and the underground Meikle Mine. Also, in July 1996 the Nevada Division of Environmental Protection (NDEP) issued a National Pollutant Discharge Elimination System (NPDES) Permit to Barrick authorizing the discharge of up to 70,000 gallons of water per minute (gpm) to the Humboldt River. Barrick completed construction of a treatment plant and conveyance system in August 1997 and discharged water to the Humboldt River from September 1997 through February 1999. In May 1997 Barrick and Elko Land and Livestock Company (ELLCO) submitted an application to the BLM to amend an existing right-of-way to authorize the installation of an additional buried pipeline across public domain land administered by the BLM as part of the existing water conveyance system. Installation of the additional buried pipeline would enhance the operational flexibility of the water distribution system established in Boulder Valley by Barrick and ELLCO.

The BLM recently prepared a Cumulative Impact Analysis (CIA) report (BLM 2000b) to address potential cumulative dewatering and discharge impacts associated with Barrick's Betze Project and Newmont Gold Company's (Newmont's) proposed South Operations Area Project Amendment and Leeville Project. The results of this analysis are summarized in Chapter 5 of this Supplemental EIS. The CIA may result in the implementation of mitigation measures to address the cumulative impacts of the ground water pumping and water management operations of these three mines. The BLM will identify monitoring programs and mitigation measures in conjunction with the affected parties; monitoring

and mitigation measures will be specified in the Final EISs for the three projects.

This Supplemental EIS evaluates the environmental effects of Barrick's ongoing Goldstrike Mine water management operations and of installing a second pipeline across public lands. Installation of the buried pipeline is the Proposed Action addressed in this Supplemental EIS.

Summary of Impacts

Continued Mine Dewatering and Discharge to the Humboldt River

Geology

Two sinkholes have been documented to-date in the area affected by dewatering at the Goldstrike Mine: (1) a sinkhole approximately 3.5 miles northwest of the center of the Betze-Post Pit, and (2) a sinkhole approximately 2.8 miles west of the center of the Betze-Post Pit. In addition, an open fracture was discovered in the bottom of the south-central portion of TS Ranch Reservoir in 1990. This fracture presumably existed prior to reservoir development; however, piping and/or dissolution of the fracture-filling material occurred after the reservoir was used to store water.

Available information on the geology in the region and prediction of ground water drawdown were used to identify areas that potentially could be susceptible to sinkhole development. These areas include the large area underlain by carbonate rock located between the Betze-Post Pit and the Gold Quarry Pit, and the area northwest of the Betze-Post Pit. The development of sinkholes can pose a hazard to livestock, humans, and wildlife. If a sinkhole develops in an area containing buildings, roads, or other structures, damage to these structures may result.

Water Resources and Geochemistry

Impacts from Mine Dewatering and Localized Water Management Activities

As of the end of 1998, over 1,500 feet of drawdown of the water table had occurred in the vicinity of the Goldstrike Mine. The area with at least 10 feet of measured drawdown extends approximately 15 miles northwest-southeast and 5 miles northeast-southwest.

Barrick began delivering water to the TS Ranch Reservoir in May 1990. A large percentage of the water that flowed into the reservoir seeped through a fracture in the floor of the reservoir and flowed into the rhyolite formation. The seepage resulted in mounding (increased ground water elevations) in the rhyolite and alluvial aquifers in upper Boulder Valley. In 1992 and 1993, seepage from the reservoir resulted in three new springs (Sand Dune, Knob, and Green springs) in the northeastern portion of Boulder Valley. Barrick continued to infiltrate water into the fracture until early 1996 when ground water mounding and discharge from the springs in Boulder Valley reached a maximum with the combined flows reaching a peak of approximately 30,000 to 35,000 gpm. At the end of 1998, water levels in the Boulder Valley region had risen approximately 70 feet in the Sheep Creek Range and 50 feet in the alluvium in upper Boulder Valley. From April 1996 through early 1999, water management activities were modified to include discharge to the Humboldt River such that excess mine water no longer seeped through the fracture. As a result, the flows in the springs diminished to approximately 5,000 gpm by the end of 1998; ground water mounding also diminished during this period. Beginning again in 1999 and under Barrick's current water management plans, excess water would be allowed to infiltrate into the rhyolite formation in Boulder Valley through the end of mining. However, ground water levels are carefully monitored to keep spring discharges to a minimum. Under this scenario, the area affected by ground water mounding would persist through the end of mining and would gradually dissipate in the postmining period.

A numerical model was used to estimate the areal extent, magnitude, and timing of drawdown from the Goldstrike Mine through the end of mining and into the postmining period. The extent of the 10-foot drawdown contour would expand after mining ceases and would reach a maximum extent approximately 100 years postmining. At 100 years, the 10-foot drawdown contour is predicted to extend approximately 11 miles northwest, 15 miles southeast, and up to 12 miles southwest from the center of the Betze-Post Pit. The expansion of the area of drawdown would

result in part from continual long-term passive inflow of ground water to the pit.

As of the end of 1998, there were 14 identified spring sites located within the existing 10-foot drawdown contour; several of the monitored springs had either dried up or had reduced flow. These springs are located in Boulder Creek, Brush Creek, and upper Rodeo Creek in the vicinity of the Betze-Post Pit. Mine dewatering activities have probably caused at least three of these monitored springs to dry up. It is possible that other springs in these areas, in addition to those currently included in the annual monitoring program, also have been affected by mine dewatering.

There are 67 identified spring sites located within the maximum model-predicted area having at least 10 feet of drawdown. Individual springs and perennial stream reaches are supported by discharge from either the regional ground water aquifer system or from more isolated or perched aquifers residing above the regional ground water system. Only those perennial sources that are hydraulically connected to the regional ground water system could potentially be impacted by mine-induced drawdown. Based on available information, significant impacts to springs and perennial waters located on the eastern slope of the Tuscarora Mountains are generally not anticipated. Impacts are likely at local spring and stream reaches located east of the Betze-Post Pit on the western slope of the Tuscarora Mountains as the magnitude and area of drawdown expands in the future. In this region, springs and perennial streams at higher elevations (generally above 6,000 feet) are less likely to be affected than those at lower elevations. Current drawdown patterns and projected drawdown indicate that the area of drawdown is expanding in a northwest direction toward the upper Antelope Creek and Squaw Creek areas. If drawdown extends to this area in the future, some springs and perennial stream reaches, particularly in upper Antelope Creek (below the confluence with Squaw Creek) and lower Squaw Creek, could be affected.

A potential reduction in the baseflow of perennial springs and streams could affect surface water rights within the drawdown area. There are 19 surface water rights that potentially could be impacted by dewatering-induced drawdown. Of these, seven are used for irrigation, seven for stock watering, three for mining and milling, and two for wildlife. The actual potential for impacts to individual water rights would depend on the site-specific hydrologic conditions that control surface water discharge.

The results of hydrologic modeling indicate that water levels in 64 wells potentially could be lowered by 10 to over 100 feet as a result of Barrick's ground water pumping. Specific impacts to individual wells would depend on the well completion, including pump setting, depth, yield, and premining static and pumping water levels. Lowering the water levels in these water supply wells potentially could reduce yield, and/or increase pumping cost, or if the water level were lowered below the pump setting or below the bottom of the well, the well would become unusable.

No detectable changes in ground water quality have been observed in monitoring wells located in areas of Boulder Valley where water management activities have caused ground water mounding. Based on the monitoring to-date, future infiltration activities in Boulder Valley associated with the mine water management activities are not expected to affect water quality in the alluvial and rhyolite ground water system.

Once dewatering operations cease, a pit lake would begin to develop in the Betze-Post Pit. The pit lake is predicted to attain steady state (or equilibrium) conditions at greater than 200 years after mining. After the pit lake level reaches equilibrium, the numerical ground water model predicts that because of evaporation, a long-term cone of drawdown would persist for the foreseeable future. Based on the hydrologic model, the pit lake is predicted to behave as a long-term hydraulic sink; therefore, outflow from the pit lake to the surrounding ground water system is not expected. In the long term, the pit lake water is predicted to be near neutral pH. The predicted concentrations of total dissolved solids and sulfate and concentrations of antimony are predicted to exceed Nevada drinking water standards. Total dissolved solids and sulfate concentrations would gradually increase over time as a result of evapoconcentration of the lake waters. However, since the pit lake is not expected to discharge to either surface or ground

water, the pit lake is not expected to degrade surrounding waters of the state.

Impacts to the Humboldt River

Discharges to the Humboldt River from the Goldstrike Mine were initiated in September 1997 and continued through February 1999. The maximum recorded discharge rate was approximately 57,000 gpm (127 cubic feet per second) during October and November 1997; much smaller discharges occurred due to irrigation during the growing season of 1998. Discharges to the river varied between approximately 22,000 and 50,000 gpm (50 to 110 cubic feet per second) in late 1998 and early 1999 before ceasing altogether.

During the period of Goldstrike Mine discharges, Humboldt River flows were within the natural range of historic flows and mimicked the high snowmelt-derived flows of the 2 years prior to the mine discharges. Since there is a substantial reduction in river channel flows in the downstream direction, modifications to flow conditions were less at Comus and farther downstream than they were at Battle Mountain. Water levels in the river during the high-flow seasons were not affected, and low-flow levels increased by approximately 1 foot. Changes to channel geometry likely were limited to erosion and sedimentation in the low-flow section of the river; these effects were removed or substantially mitigated by much higher flows in the river during spring runoff. Lateral channel migration is not known to have been directly caused by mine discharges. The reaches immediately upstream and downstream of the Goldstrike Mine outfall have undergone changes in position historically, and natural channel modifications are difficult to separate from potential discharge impacts to-date. If future Goldstrike Mine discharges occur, computer simulations indicate that projected impacts would be similar in their limited extent and magnitude to the impacts to-date. Major changes to water uses or water rights for the Humboldt River have not occurred to-date and are not expected from future Goldstrike Mine discharges, if they occur. Based on projected ground water drawdown at the end of mining and 100 years postmining, baseflow impacts to the Humboldt River directly from Goldstrike Mine dewatering are not anticipated.

It is conceivable that if Barrick discharges to the river in wet years, a very small portion of the annual evaporation from the Humboldt Sink may be accounted for by the discharge contributions. As a result, temporarily greater water depths and extent are possible at the sink; in high water years, this additional water could contribute to spillover into the Carson Sink. Impacts from these conditions would not be expected to be frequent or especially detrimental since they have occurred historically, because there are substantial withdrawals from the river upstream of the sinks.

Barrick's outfall discharges recorded between September 1997 and February 1999 have been within permit limitations. Provided that the mine discharges are in accordance with the permit limitations, impacts to water quality in the river are not anticipated. On an average annual basis, the mine discharge represents a load increase in total dissolved solids, boron, copper, fluoride, and zinc compared with Humboldt River premine conditions. The loads from continued Goldstrike Mine discharge would likely increase total dissolved solids, boron, and fluoride loads in the Humboldt Sink over the mine discharge period; however, the relative magnitudes of these potential increases do not appear to be substantial. Nevertheless, depending on concentrations in the Humboldt Sink, parameter solubilities, and other physical and biological factors, these increased loads to the sink potentially could increase concentrations in the sink wetlands.

Riparian Vegetation

Mine-induced drawdown from Barrick's dewatering could affect 137 acres of the 662 acres of riparian vegetation located within the 10-foot drawdown area. Of these, approximately 135 acres occur in Boulder and Bell creeks (Rock Creek Watershed), 1 acre occurs in Welches Creek (Rock Creek Watershed), and 1 acre associated with Soap Creek (Maggie Creek Watershed). Approximately 13 acres of wetland vegetation associated with isolated seeps and springs also could be affected. Therefore, a total of approximately 150 acres of riparian/wetland vegetation would potentially be affected by mine-induced drawdown.

Previous Goldstrike Mine discharges to the Humboldt River generally did not affect riparian vegetation since the flows were within the natural range of historic flows; minor fluctuations in the water level during this period likely had minimal effects on the extent of riparian and wetland vegetation along the river. Future discharges, if they occur, may affect riparian and wetland vegetation since channel configuration, depth, and sinuosity may change as a result of the increased water level during low-flow periods.

Terrestrial Wildlife

Mine dewatering could reduce the amount and extent of surface water and associated riparian habitats of springs, seeps, and perennial stream reaches within the study area that are used by a variety of terrestrial wildlife species. Potential reduction or loss of available water could affect wildlife resources by: (1) a decrease in available water for consumption; (2) loss of breeding, foraging, and cover habitats; (3) reduction in regional carrying capacity; (4) displacement and loss of animals; (5) decrease in biological diversity; (6) possible genetic isolation; (7) reduction in prey availability; and (8) possible long-term impact to population numbers, depending upon the species and relative habitat quality. Incremental habitat loss could affect big game, upland game birds, waterfowl, shorebirds, raptors, songbirds, nongame mammals, reptiles, and amphibians. Ground water drawdown could affect 150 acres of riparian habitat and wetlands used by terrestrial wildlife species. Available water and associated riparian vegetation would be affected in mule deer summer and transitional ranges, resulting in reduced carrying capacity and displaced animals. Pronghorn summer and transitional ranges also would be affected. In addition, increased leaching of minerals and salts into the soils of Boulder Valley would occur as mine dewatering ceases, modifying the upland vegetation into a more salt-tolerant plant community. Over the long term the pit lake is predicted to have a near neutral pH. However, there is a small potential (5 percent probability) that the lake could be acidic during the early years with the pH gradually increasing over time to near neutral conditions. Long-term exposure to future pit lake water quality is not anticipated to cause acute impacts to wildlife, chronic impacts from reduced pH are unknown.

Discharges to the Humboldt River could result in a short-term increase in available water and support of riparian habitats. The support and development of additional backwater or slough areas would provide nesting, brooding, foraging, and resting habitat. Additional open water may occur in the winter period, which would provide increased foraging opportunities. Potential habitat loss (e.g., nesting or foraging areas) from seasonal flooding along the river during high-flow periods (spring and early summer) would be offset by the creation and enhancement of other wetland areas along the river corridor that currently do not receive sufficient water for optimal wildlife habitat. Increased flows into the Humboldt Sink would improve breeding, foraging, and resting opportunities for resident and migratory wildlife species in the short term.

Potential risks to wildlife from additional mine discharges and possible contaminant loading in the Humboldt Sink would likely be similar to those assessed for premining conditions. However, a number of variables exists that make it difficult to predict future conditions. These variables include the dynamic system of the sink, upstream water demands and fluctuating water levels, bioaccumulation factors of certain constituents of concern (e.g., boron, selenium, mercury), and a number of environmental factors.

Aquatic Resources

Goldstrike Mine dewatering could reduce water levels or flows in some springs and perennial reaches within the Boulder Creek and upper Antelope Creek drainages. Drawdown is not expected to affect flows in other streams. The effect of decreased perennial streamflows or water levels on aquatic resources would be a reduction of aquatic habitat that supports native fish species, periphyton, and macroinvertebrate communities. Habitat reductions would likely result in decreased numbers in these communities. If stream segments become dry as a result of reduced flows, aquatic habitat and associated biota would be eliminated. Potential changes in water quality as a result of flow reductions would not likely affect biotic communities, since biota are tolerant of fluctuating temperatures and other parameters.

The effects of flow increases on aquatic communities in the Humboldt River would include both beneficial and adverse impacts. Discharges to the river would result in a beneficial impact of increased habitat for fish, macroinvertebrates, and periphyton. However, the possible reduction of shallow pools and braided channels could adversely affect the development of young fish. Increased flows are not expected to affect fish composition. Fish dispersal patterns are expected to be similar to present conditions. Overall, the effects of increased flows on water quality conditions, such as sediment levels, temperature, and metal concentrations, would be minor.

Threatened, Endangered, Candidate, and Sensitive Species

Mine dewatering could result in reduction of riparian habitats that may be used by the following terrestrial wildlife species: Preble's shrew, six sensitive bat species, bald eagle, golden eagle, Swainson's hawk, ferruginous hawk, northern goshawk, burrowing owl, sage grouse, white-faced ibis, black tern, and Nevada viceroy. The potential reduction in perennial flows or water levels in springs could reduce the amount of riparian and wetland habitats, which may be used by certain species for cover, foraging, breeding, or other biological requirements. The incremental loss of potential foraging areas would not be considered significant for Federally-listed species (i.e., the bald eagle), based on the incidental use by migrating and wintering eagles of the area potentially affected by the project.

Over the long term the pit lake is predicted to have a near neutral pH. However, there is a small potential (5 percent probability) that the lake could be acidic during the early years with the pH gradually increasing over time to near neutral conditions. Long-term exposure to future pit lake water quality by species, such as the bald eagle or bat species, would not cause acute effects from either increased metals or reduced water pH (5 to 6); potential chronic effects from reduced pH levels are more of an unknown. However, since it is expected that future aquatic communities would likely remain low and would not represent a substantial food source for avian or mammalian wildlife, the incidence of potential foraging in the future pit lake by species of special concern would be expected to be incidental and sporadic.

Discharges to the Humboldt River would result in a short-term increase in available water for many of the special status species identified for the study area. Increased flows in the Humboldt River could improve and enhance the riparian community, which could be used by these species for breeding, foraging, resting, and cover. Increased annual flows may result in a greater amount of open water areas during the winter season, which would increase available foraging areas for wintering bald eagles. The potential impacts to species occurring in the Humboldt Sink area from chemical constituents of concern would be the same as discussed for terrestrial wildlife.

The potential short- and long-term effects to special status species would parallel those discussed for general wildlife resources. Possible effects from increased water discharges to the Humboldt River and Humboldt Sink would be the same as discussed for terrestrial wildlife.

The potential effects of drawdown on aquatic species would be limited to springsnails and the Columbia spotted frog. Water level reductions in springs located in upper Antelope Creek would decrease habitat for springsnails. Drawdown would not affect one known spring inhabited by springsnails in upper Willow Creek. In addition, flow reductions in perennial reaches in upper Antelope Creek also may affect potential habitat for the spotted frog. Population numbers may decrease if a large portion of habitat is removed. Drawdown from the Goldstrike Mine is not predicted to affect flows in the Maggie Creek and Rock Creek subbasins, which support existing populations of the Lahontan cutthroat trout and potential habitat and existing populations of the California floater.

Grazing Management

Impacts that may occur as a result of ground water drawdown from Barrick's water management operations include reduced flow or complete cessation of flow in springs and other water sources. The long-term loss of water sources would result in the reduction or loss of permitted active grazing use within an allotment if

alternative water sources are not present within the vicinity of the affected water sources or if lost water sources are not mitigated. The reduced flow or change in a water source from perennial to intermittent would result in a reduction in season of use, which also would affect permitted active grazing use. Drawdown impacts could be localized to water sources within one or several pastures within an allotment. The loss of the majority or all of the water sources within these pastures would likely affect livestock distribution, forage utilization, and grazing management operations.

Some of the water sources (i.e., water-related range improvements and natural perennial water sources) in the Twenty-five and T Lazy S allotments potentially could be affected by Goldstrike Mine drawdown. In the Twenty-five allotment, approximately 30 percent of the natural perennial water sources within the Boulder Creek pasture could potentially be affected by Goldstrike Mine ground water drawdown. Approximately 25 percent of the water related range improvements and approximately 10 percent of the natural perennial water sources in the T Lazy S allotment could be affected by Goldstrike Mine drawdown. The potential long-term loss of these water sources may result in the long-term loss of permitted active grazing use or reduced forage utilization.

During the period of mine dewatering discharge, slightly increased water levels within the Humboldt River floodplain would likely increase the areal extent of herbaceous wetlands immediately adjacent to the river channel. Forage production and the carrying capacity of these narrow areas also would likely increase temporarily. Discharge waters reaching the Humboldt and Carson sinks would not affect grazing management since livestock grazing is not allowed within these areas.

Socioeconomics

Barrick's mine dewatering and water management operations have provided water for approximately 8,000 additional acres of irrigated hay fields with resulting hay production. In the unlikely event that Barrick were to discharge mine dewatering water to the Humboldt River, there could be a minor increase in available irrigation water associated with additional storage in Rye Patch Reservoir. Mine-induced ground water drawdown from Barrick's dewatering could result in some reduction in water availability for cattle grazing and a slight reduction in hunting and fishing opportunities associated with a reduction in surface water resources.

Proposed Action (Buried Pipeline)

Air Quality

Surface disturbance and the operation of heavy machinery would generate fugitive dust during construction; however, this activity would have minimal impacts on local air quality because of the small disturbance area and 2-week time frame for construction.

Topography and Soils

Local topography would not be affected by installation of the pipeline since the right-of-way would be graded, restored to natural contours, and reclaimed. Based on the entire 200-foot construction right-of-way width being disturbed (which is wider than actually anticipated), a maximum of l8 acres of soils could be temporarily disturbed.

Water Resources

No impacts to water resources would result from constructing of the pipeline, since natural topography and drainage features would be restored following construction.

Vegetation, Including Threatened, Endangered, Candidate, or Sensitive Species

A maximum of 18 acres of the big sagebrush/grassland vegetation type could be removed by construction of the proposed pipeline; realistically, less disturbance would occur. The disturbed area would be reclaimed promptly using an approved seed mixture. Herbaceous species (grasses, forbs) would re-establish rapidly, while shrub species (big sagebrush) would re-establish within 5 to 10 years. There is a potential for continued invasive non-native weed establishment along the pipeline right-of-way due to the existence of cheat grass and halogeton on the vicinity (i.e., a seed source).

No impacts to threatened, endangered, candidate, or sensitive plant species would result from implementing the Proposed Action.

Wildlife, Including Threatened, Endangered, Candidate, or Sensitive Species

Impacts to area wildlife would be limited to a short-term, incremental reduction in habitat and an increase in disturbance from pipeline construction. Potential disturbance factors would include increased noise and human presence during the 2-week construction and subsequent reclamation periods. If these activities were to occur during important seasonal periods (e.g., spring or fall migration), animals would avoid the pipeline right-of-way until initial reclamation has been completed. The impacts to mule deer and pronghorn could be potential displacement, possibly increasing energy requirements during high stress periods (e.g., severe storm events).

If construction occurred during the breeding season (March through August), it is assumed that the annual breeding potential for these displaced species would be lost for that year, but individuals would likely return following construction and successful reclamation. The anticipated displacement of individuals, interference with breeding activities, and possible mortality of the less mobile species would not be expected to result in population-level effects.

Potential direct impacts to special status species from pipeline construction would be limited to the Preble's shrew and burrowing owl. Equipment access and pipeline trenching activities may crush individuals, if either species were to occur within the areas proposed for disturbance. The probability that the shrew occurs in this area would be low; however, the burrowing owl has been documented nesting in the project vicinity. Loss of eggs, young, or incubating adult owls could occur if construction were to occur during the breeding season.

The incremental reduction in the native sagebrush/grassland community from pipeline construction would result in a short-term loss of potentially suitable foraging habitat for the Preble's shrew, long-legged myotis, fringed myotis, Townsend's big-eared bat (both subspecies), bald eagle, golden eagle, Swainson's hawk, ferruginous hawk, burrowing owl, and sage grouse. Upon successful right-of-way reclamation, the foraging opportunities along this pipeline alignment would be expected to approach pre-construction levels.

Grazing Management

The loss of forage within the area of temporary disturbance would be minimal relative to the total area available for livestock grazing.

Access and Land Use

The proposed pipeline project would increase the quantity of water that can be delivered for irrigation by approximately 8,000 gpm during peak irrigation periods. There would be no effects to access. The in-place abandonment of the pipeline would result in potential future land use conflicts.

Cultural Resources

No sites identified within the proposed pipeline project area were determined to be significant or eligible for inclusion on the National Register of Historic Places.

Visual Resources

The rangeland that would be crossed by the right-of-way would visually accommodate the pipeline project because reclamation would restore the original landform, and revegetation would approximate original colors and textures. The project would be compatible with the BLM's Visual Resource Management Class IV designation.

No Action

The No Action Alternative would eliminate potential impacts of the Proposed Action on all resources.

Impact Summary Table

Table S-1 summarizes the impacts and the monitoring and mitigation measures associated with the dewatering and water management operations of the:

- Betze Project, as analyzed in the Betze Project Final EIS (1991b) and the associated Record of Decision (BLM 1991d).

- Meikle Mine Development EA (BLM 1993a) and the associated Finding of No Significant Impact and Decision Record (BLM 1994c), and the Biological Assessment of Barrick's Dewatering Operations (BLM 1994b).

- Goldstrike Mine, including possible discharge to the Humboldt River, as analyzed in this Supplemental EIS.

Table S-2 summarizes the impacts and monitoring and mitigation measures associated with the Proposed Action analyzed in this Supplemental EIS, i.e., the buried pipeline.

All of the monitoring and mitigation measures identified in Tables S-1 and S-2 are measures recommended by the BLM for the Draft Supplemental EIS. The BLM will re-evaluate these measures for the Betze Project Final Supplemental EIS and the Record of Decision.

The impacts identified in the Supplemental EIS are independent of the impacts identified in the original Betze Project EIS; however, the impact analysis in this Supplemental EIS reflects the monitoring programs and mitigation commitments specified in the Betze Project ROD (BLM 1991d). Additional monitoring and mitigation measures for this Supplemental EIS are associated mainly with the dewatering and water management activities. Where applicable, these additional monitoring and mitigation measures tier from relevant monitoring/mitigation identified in the Betze Project ROD.

Agency Preferred Alternative

In accordance with the National Environmental Policy Act, federal agencies are required by the Council on Environmental Quality (40 Code of Federal Regulations 1502.14[e]) to identify their preferred alternative for a project in the Draft EIS, if a preference has been identified. As discussed in Chapter 1, the Proposed Action for this Supplemental EIS, i.e., the action upon which the BLM will make a decision, is the installation of the buried water pipeline. The BLM has identified the Proposed Action as the agency preferred alternative. The BLM is reviewing monitoring and mitigation measures identified during the analysis of the Proposed Action and Barrick's continuing dewatering and water management operations; the BLM will identify required monitoring and mitigation measures in the Record of Decision for this Supplemental EIS.

Table S-1
Summary of Dewatering and Water Management Impacts and Monitoring/Mitigation

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
GEOLOGY					
• No anticipated impact.	• None	• No anticipated impact.	• None	• Two sinkholes have formed in response to mine dewatering; areas underlain by carbonate rock located northwest and southeast of the Betze-Post Pit could be susceptible to future sinkhole development.	• Monitoring and reporting of any suspected subsidence features to BLM. • Develop and implement site-specific remedial measures as approved by the BLM.
WATER RESOURCES AND GEOCHEMISTRY					
Dewatering and Drawdown					
• Dewatering expected to continue through 2000; target elevation 4,160 feet, with rates up to 29,300 gpm.	• NA	• Decision authorized continuation of dewatering through 2001; dewatering to the target elevation authorized by the Betze EIS.	• Significant modifications of the Plan of Operations for the Meikle Project affecting federal lands must be reviewed and approved by the BLM prior to implementation.	• Dewatering expected to continue until 2010; target elevation 3,576 feet, with rates up to 69,000 gpm.	• NA
• Drawdown: Area projected to experience ≥10 feet of drawdown would extend up to 6 miles from pit at end of mining (year 2000), and continue to expand (up to 10 miles from the pit) up to year 2030 and then start to contract.	• Monitoring ground water levels and water quality, and flow and water quality at surface water stations on a monthly basis; monitoring plan reviewed annually by the BLM to determine necessary changes. • Barrick would continue monitoring for a period extending up to 30 years after completion of mining. Monitoring after this period would be funded by a Long-Term Monitoring Fund.	• Area projected to experience >10 feet of drawdown would expand up to 17 miles approximately 30 years after mining (see Figure D-11) followed by recovery to within 45 feet approximately 100 years postmining.	• Expand monitoring network (surface and ground water) between the mine and any LCT habitat, in consultation with BLM and the Nevada State Engineer. • BLM may require additional monitoring as necessary to monitor impacts to LCT or other sensitive resources.[1] • Submittal of all monitoring reports to BLM, quarterly. • Barrick to install and operate reinjection wells, if necessary, to prevent adverse impacts to LCT waters.[1] • If no reasonable or prudent alternatives exist to mitigate impacts to endangered or threatened species, BLM may direct Barrick to cease mining.[1]	• Drawdown: Area projected to experience ≥10 feet of drawdown would extend up to 12 miles from pit at end of mining (year 2010), and continue to expand (up to 15 miles from pit) until 100 years postmining and then start to contract.	• The ground water monitoring system has been expanded since the Betze EIS. The monitoring plan would continue to be reviewed annually by the BLM and revised as necessary. • BLM would review existing funds for adequacy and adjust, if appropriate.

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
Seeps, Springs, and Perennial Streams					
• Seeps and Springs: 10-foot drawdown contour projected to encompass 57 springs by end of mining (2000), and 111 seeps and springs by 2030; most of these were expected to show reduced flow or dry up (if hydraulically connected to the regional system).	• Monitoring of stream segments, seeps, and springs (annually), and some stream sites (monthly) and providing results to the BLM. • Establishment of Wetland Mitigation Fund ($660,000) available to the BLM for the protection and or enhancement of riparian and wetlands to mitigate drawdown impacts.	• Seeps and springs could be impacted from drawdown (number not estimated).	• None	• Seeps and Springs: At the end of 1998, several spring and seep sites showed reduced flow or dried up. The projected 10-foot drawdown contour is predicted to encompass 70 spring sites; 44 of these are located in areas where surface waters could be impacted, 26 are located in areas where impacts are less likely.	• Flow and water quality are monitored monthly at stream stations and annually in representative spring sites, and the results are provided to the BLM. This monitoring program would be reviewed at least annually and revised, as necessary, in conjunction with the BLM. Spring monitoring would continue through the end of mining and for up to 30 years postmining.
• Streams: The lower perennial reaches of Brush, Bell, and Boulder creeks were expected to have reduced flows.	• Provide funds for the acquisition and maintenance of alternative water sources (e.g., guzzlers, cisterns, purchase of water rights, etc.) (maximum of $50,000).	• Additional impacts to perennial flows from drawdown not identified.	• None	• Streams: Similar to the original EIS, except that drawdown could reduce flows in Antelope Creek and tributaries .	• If surface water monitoring of streams and representative spring sites indicates a reduction of flow potentially resulting from mine-induced drawdown, additional resource inventories would be performed to identify the areal extent and magnitude of impacts to flow in seeps, springs, or perennial stream reaches. • The BLM would evaluate the available information to determine if mitigation is required. • If mitigation is required, a detailed site-specific mitigation plan would be prepared to repair or replace the impacted perennial water resources. Mitigation would depend on the actual impacts, site-specific conditions, and the feasibility of implementation and could include a variety of measures: 1. Augmenting or replacing flows by drilling well(s) and pumping or piping water from other nearby sources to restore the average historic baseflow at the perennial water resource (seep, spring, or stream). Any replacement water source used to augment or replace flows would meet the water quality criteria applicable for the historic beneficial use (such as aquatic life, irrigation, or livestock watering).

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
					2. On-site or off-site improvements including fencing to limit grazing, installation of guzzlers, or other measures to enhance water yield. • Any approved site-specific mitigation plan would be implemented followed by monitoring and reporting to verify success of the implemented measures. If initial mitigation were unsuccessful, the Authorizing Officer may implement additional site-specific mitigation measures. • Barrick would be responsible for funding all monitoring, resource inventories, mitigation plan development, and implementation of mitigation measures required by the BLM or other state or federal agencies.
Water Rights					
• Reduction in ground water levels in ground water supply wells during dewatering and recovery.	• If monitoring demonstrates impairment of water rights, the Authorizing Officer may, in consultation with the Nevada State Engineer, require Barrick to provide alternative water sources or assistance to mitigate or eliminate such impacts.	• Impacts to water rights associated with drawdown not identified.	• None	• Additional water rights (surface and ground water) could be affected by mine-induced drawdown.	• Barrick would continue to monitor surface and ground water to determine the extent of drawdown as required by the State Engineer. Adverse impacts to water rights (surface water or ground water) would be mitigated as required by the Nevada Division of Water Resources.
Ground Water Mounding					
• Mounding would occur in Boulder Valley due to irrigation infiltration.	• None	• Mounding predicted by modeling; impacts associated with ground water mounding not identified.	• None.	• Ground water mounding from infiltration of excess mine dewatering water has been more extensive than originally estimated; mounding reached a maximum in 1996 and is predicted to gradually subside in the future.	• None

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
Pit Lake					
• Lake predicted to have neutral pH; potential for elevated arsenic levels.	• Quarterly monitoring of pit water quality for arsenic and other identified constituents of concern until at least 2030,and thereafter if necessary; monitoring activities after 2030 would be funded by the Long-Term Monitoring Fund. • Funding of research of issues related to postmining pit water quality at $50,000 per year for 10 years.	• No additional evaluation.	• None	• Updated predictions indicate lake is likely to have near-neutral pH with antimony concentrations ranging from 0.04-0.06 mg/L; TDS and sulfate are predicted to gradually increase over time. Slight possibility lake may be acidic in early (up to 26) years with associated elevated metals concentrations. • Pit lake predicted to act as a long-term hydraulic sink; outflow to ground water is not expected. Arsenic concentrations predicted to be at or below detection limits.	• None
Humboldt River Flow					
• No anticipated impacts.	• Barrick is providing $1,000,000 for USGS Humboldt River study.	• No anticipated impact; direct discharge not proposed.	• None	• Excess mine dewatering water was discharged to the Humboldt River from September 1997 through February 1999 at rates ranging from 22,000 to 50,000 gpm. Flows measured in the river were within historic ranges during the discharge period.	• None
				• Barrick's current plans indicate that future discharges are unlikely; however, Barrick is permitted to discharge in the future up to 70,000 gpm.	• Monitoring of the river channel in the vicinity of the discharge outfall, prior to, during, and after the discharge period. • If impacts are identified, Barrick would be responsible for mitigating these impacts with approval from applicable Federal and state agencies.
Humboldt River Water Quality					
• No anticipated impact.	• None	• No anticipated impact; direct discharge not proposed.	• None	• Discharges were within permit limitations; discharges would likely result in a relatively small incremental increase in TDS, arsenic, boron, and fluoride loads in the Humboldt Sink.	• None

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
VEGETATION (INCLUDING RIPARIAN)					
• Dewatering activities could potentially affect up to 330 acres of riparian vegetation.	• Provide funds for protection and enhancement of riparian and wetland vegetation (maximum contribution of $660,000).	• No dewatering impacts identified.	• None	• Ground water drawdown could affect 136 acres of riparian vegetation in the Boulder Creek drainage and 1 acre in the Maggie Creek drainage. In addition, ground water could affect 13 acres of wetland vegetation associated with isolated seeps and springs.	• Improvement of habitat conditions in the Squaw Valley allotment (also being considered for cumulative effects mitigation).
	• Provide funds for post-dewatering revegetation of riparian and wetlands with seedings of container plants (maximum of $40,000).			• Approximately 13 acres of wetlands associated with 44 seeps and springs could be affected by flow reductions.	• If seeps and springs were impacted by drawdown, surface water monitoring and mitigation identified in Water Resources and Geochemistry would be applied.
• Dewatering discharges could increase the amount of riparian vegetation in the irrigation area and an unnamed drainage.	• Monitor riparian and wetlands until at least 2030. • Provide funds for the acquisition and maintenance of alternative water sources (e.g., guzzlers, cisterns, purchase of water rights, etc.) (maximum of $50,000).			• Increased discharge to Humboldt River could result in additional support of riparian vegetation and short-term expansion of riparian community.	• None
TERRESTRIAL WILDLIFE					
Dewatering and Drawdown					
				• Minor restrictions to small animal movement from water conveyance canal.	• None
• Dewatering could result in reduction or loss of available surface water for wildlife use in an estimated 111 seeps and springs by 2030.	• Monitor springs, seeps, riparian areas, and wetlands until at least 2030 (up to $250,000).	• Continued availability of water at the TS Ranch Reservoir for wildlife use.	• None	• Approximately 44 springs, and associated wildlife habitat, are located in areas where surface waters could be affected in the long term.	• None
• Dewatering could result in reduction in available water in the lower perennial reaches of Brush, Bell, and Boulder creeks.	• Variety of monitoring points along perennial drainages.			• Potential long-term impacts to perennial stream reaches and associated wildlife would be similar to the Betze FEIS; however drawdown could reduce flows in Antelope Creek and its tributaries.	• Monitoring and mitigation of perennial streams, riparian habitat, and wetlands as described under Water Resources and Geochemistry and Vegetation.
• Dewatering activities could potentially affect up to 330 acres of riparian habitat.	• Fund protection and enhancement of riparian and wetlands areas (maximum contributed $660,000).			• Ground water drawdown could potentially affect 136 acres of riparian habitat in the Boulder Creek drainage and 1 acre in the Maggie Creek drainage.	• Barrick would coordinate with the BLM to implement specific land use changes of the Squaw Valley Allotment, which would provide off-site habitat enhancement for terrestrial wildlife species, including improvements in riparian areas (also being considered for cumulative effects mitigation).

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
• Overall impacts to terrestrial wildlife resources from ground water drawdown activities could include the overall long-term reduction in available surface water; riparian and mesic vegetation; wetland areas; possible loss or reduction in cover, breeding sites, and foraging areas; animal displacement and incremental habitat fragmentation; and possible reduction in the associated habitat carrying capacity of affected areas.	• Fund post-dewatering revegetation of riparian and wetlands with seedlings or container plants (maximum of $40,000). • Fund the acquisition and maintenance of alternative water sources (guzzlers, cisterns, etc.) (up to $50,000). May include (but not be limited to) purchase of water rights at off-site locations or acquisition of wildlife easements to water sources. • Long-term Monitoring and Mitigation Fund of $1,000,000 for review, monitoring, and mitigation of effects not specifically identified in EIS and not covered by reclamation plan.			• Ground water drawdown could affect 13 acres of wetland habitat and wildlife associated with perennial reaches and 44 seeps and springs. • Reduction in mesic areas. • Possible decreased riparian plant vigor or loss of vegetative cover. • Possible reduction or loss of cover, breeding sites, and foraging areas. • Possible increases in surface water temperature. • Reduced carrying capacity in habitats affected by loss of available water or riparian vegetation. • Possible reduction in certain animal populations that depend on affected springs, wetlands, or stream reaches.	• Monitoring and mitigation of perennial streams, riparian habitat, and wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures.
• Potential increase in mule deer mortalities from shifts in mule deer migration patterns.	• Fund mule deer habitat improvements, in consultation with the BLM and NDOW (maximum contribution $125,000). • Funds for the acquisition and maintenance of alternative sources of water (e.g., guzzlers cisterns, purchase of water rights, etc.) (maximum contribution of $50,000).			• Reduction or loss of water in mule deer summer and transitional ranges, resulting in reduced carrying capacity and animal displacement. • Reduction or loss of water in pronghorn summer and transitional ranges, resulting in reduced carrying capacity and animal displacement. • Reduction in overall biodiversity. • Animal displacement and incremental habitat fragmentation.	• Monitoring and mitigation of perennial streams, riparian habitat, and wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures. • As discussed above, land use changes within the Squaw Valley Allotment would improve overall habitat conditions for riparian areas (also being considered for cumulative effects mitigation).

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
				• Possible genetic isolation of localized, less mobile species dependent on affected riparian sites. • Reduction in available water, riparian habitats, mesic areas, and potential nesting and brooding habitats for upland game birds.	
• Potential loss of raptor breeding habitat (e.g., red-tailed hawk), based on habitat loss and reduction of prey abundance.	• Monitoring and mitigation of riparian habitats, wetlands, and perennial streams, as discussed above.			• Potential reduction in prey base for predators, such as raptors, from reduced water levels and riparian habitats.	
• No anticipated impacts.	• None			• Gradual decrease in shorebirds and waterfowl in Boulder Valley, as surface water levels return to pre-mining levels and habitats return to upland communities.	• None
• No anticipated impacts.	• None			• As mine dewatering ends and soils dry in Boulder Valley, increased leaching of minerals and salts into the soil surface and subsurface layers, modifying associated plant communities.	• None
• Discharge of water into the unnamed drainage that flows into the TS Ranch Reservoir could change the amount, character, and duration of wildlife habitat along the unnamed drainage, around the reservoir, and in irrigated areas in Boulder Valley.	• Monitoring and mitigation of riparian habitats, wetlands, and perennial streams. • Monitor creek channels and mitigate with channel armoring, as necessary.			• NA	• NA
Pit Lake					
• Lake predicted to have neutral pH; potential for elevated arsenic levels.	• Monitor post-mining pit lake water quality quarterly until at least 2030. • Fund research on pit lake water quality ($50,000/year up to 10 years).	• NA	• NA	• Slight potential for short-term chronic impacts due to low pH.	• Monitoring and mitigation of riparian habitats, wetlands, and perennial streams as described under Water Resources and Geochemistry.
Humboldt River Flow					
		• NA	• NA	• Increased flows in Humboldt River would result in improved maintenance and establishment of riparian vegetation in the short term. • Increased river flows could improve water quality and quantity and riparian habitat for wildlife species.	• None

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
				• Increased river flows could result in more open water during low-flow periods. • Greater flows and water depths in the river and Humboldt Sink could limit use by breeding and foraging individuals, although other areas should become established.	
				• Increased flows in the Humboldt Sink would provide additional breeding, foraging, and resting areas for waterfowl and shorebirds. • Increased flows in the Humboldt Sink would increase relative prey availability for area predators.	
Humboldt River Water Quality					
		• NA	• NA	• Given existing data, additional mine discharges would not likely pose additional risks to wildlife in the Humboldt Sink beyond premining conditions.	• Continue aquatic biota monitoring study along Humboldt River and at Humboldt Sink, in cooperation with USFWS.
AQUATIC RESOURCES					
Dewatering and Drawdown					
• Dewatering activities would reduce habitat for aquatic biota in Boulder Creek drainage.	• None	• No dewatering impacts identified.	• Barrick shall prevent the introduction of nonnative aquatic species into TS Ranch Reservoir and other water bodies subject to their ownership or control.	• Dewatering activities could reduce habitat for native fish and other aquatic biota in Boulder Creek and upper Antelope Creek drainages.	• Continued monitoring of flows in perennial reaches of Boulder Creek and upper Antelope Creek drainages. • If flow reductions occur, BLM would determine if mitigation should be required. Two options could be used: 1. Flow augmentation in affected perennial stream segments as outlined in Water Resources and Geochemistry. 2. Off-site enhancement involving improvements in land use practices in the Squaw Valley Allotmont (fencing to limit grazing near upper Rock, Toe Jam, and upper Willow creeks). (Also being considered for cumulative effects mitigation)

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
Humboldt River Flow					
		• NA	• NA	• Dewatering discharges into Humboldt River would increase habitat for fish and other aquatic biota.	• None
TERRESTRIAL SPECIAL STATUS SPECIES					
Dewatering and Drawdown					
• Potential impacts to species associated with water sources and riparian or wetland vegetation could be affected by loss of seeps, springs, and perennial stream reaches.	• Monitor springs, seeps, riparian areas, and wetlands until at least 2030 (up to $250,000). • Variety of monitoring points along perennial drainages. • Monitor creek channels and mitigate with channel armoring, as necessary. • Fund protection and enhancement of riparian and wetlands areas (maximum contributed $660,000). • Fund post-dewatering revegetation of riparian and wetlands with seedlings or container plants (maximum of $40,000). • Fund the acquisition and maintenance of alternative water sources (guzzlers, cisterns, etc.) (up to $50,000). May include (but not limited to) purchase of water rights at off-site locations or acquisition of wildlife easements to water sources. • Long-term mitigation funds of $1,000,000 for review, monitoring, and mitigation of effects not specifically identified in EIS and not covered by reclamation plan.	• No dewatering impacts on terrestrial special status species were identified.	• Additional mitigation could be implemented for terrestrial species associated with riparian areas and streams if a review of ground water data indicates potential effects on surface flows.	• Potential impacts to special status species from incremental loss of available surface water, riparian vegetation, or wetlands.	• Monitoring and mitigation of perennial streams, riparian habitats, and wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures. • Land use changes within the Squaw Valley Allotment would improve overall habitat conditions for special status species that utilize riparian communities and aquatic systems (also being considered for cumulative effects mitigation). • BLM would review existing funds for adequacy and adjust if appropriate.
Pit Lake					
• See Terrestrial Wildlife.	• See Terrestrial Wildlife.			• Note: Potential impacts to wildlife from pit lake water quality would be the same for all species that use these areas.	• See Terrestrial Wildlife.

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
Humboldt River Flow					
• See Terrestrial Wildlife.	• See Terrestrial Wildlife.			• Note: Increased flows along the Humboldt River would result in short-term increase in water and riparian vegetation.	• None
Humboldt River Water Quality					
• See Terrestrial Wildlife.	• See Terrestrial Wildlife.			• Note: Potential impacts to wildlife from increased loading of metals in Humboldt Sink would be the same for all species that use these areas.	• Continue aquatic biota monitoring study along Humboldt River and at Humboldt Sink, in cooperation with USFWS.
Preble's Shrew (if present)					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• Long-term reduction in potential habitat. Short-term increase in potential habitat along Humboldt River. Potential exposure to constituents of concern at Humboldt Sink.	• Monitoring and mitigation of perennial streams, riparian habitats, and wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures.
					• Continue aquatic biota monitoring study along Humboldt River and at Humboldt Sink, in cooperation with USFWS.
Long-eared Myotis, Small-footed Myotis, Spotted Bat					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• Long-term reduction in potential foraging habitat. Short-term increase in potential foraging habitat along Humboldt River. Potential exposure to future pit lake water and constituents of concern at Humboldt Sink.	• Monitoring and mitigation of perennial streams, riparian habitats, and wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures.
					• Aquatic biota monitoring study along Humboldt River and at Humboldt Sink, in cooperation with USFWS.
Long-legged Myotis, Fringed Myotis, Townsend's Big-eared Bat					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• Same as for other three bat species discussed above.	• Same as for other three bat species discussed above.

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
Bald Eagle, Golden Eagle, Swainson's Hawk, Ferruginous Hawk					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• Long-term, incremental reduction in: **Bald Eagle:** potential foraging habitat for wintering and migrating eagles. **Golden Eagle:** potential foraging habitat and individual roost sites in riparian zones. **Swainson's Hawk:** potential foraging and nesting habitat. **Ferruginous Hawk:** potential foraging habitat. **All Four Raptor Species:** • Short-term increase in potential foraging habitat along Humboldt River. Potential exposure to future pit lake water and constituents of concern at Humboldt Sink.	**All Four Raptor Species:** • Monitoring and mitigation of perennial streams, riparian habitats, and wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures. **All Four Raptor Species:** • Continue aquatic biota monitoring study along Humboldt River and at Humboldt Sink, in cooperation with USFWS.
Northern Goshawk					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• Long-term, incremental reduction in potential foraging and nesting habitat. Short-term increase in potential foraging habitat along Humboldt River for wintering birds. Potential exposure to future pit lake water and constituents of concern at Humboldt Sink.	• Monitoring and mitigation of perennial streams, riparian habitats, and wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures. • Continue aquatic biota monitoring study along Humboldt River and at Humboldt Sink, in cooperation with USFWS.
Burrowing Owl					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• Long-term, incremental reduction in potential foraging habitat. Short-term increase in potential foraging habitat along Humboldt River.	• Monitoring and mitigation of perennial streams, riparian habitats, wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures.

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
Sage Grouse					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above. • Also, habitat improvement fund, as specified for Proposed Action. • Fund $50,000 for sage grouse mitigation.			• Potential reduction in riparian and mesic communities, affecting the amount of potential brooding and foraging habitats for sage grouse. Habitat effects could alter sage grouse distribution and possibly reduce regional grouse population.	• In addition to existing restoration fund, monitoring and mitigation of perennial streams, riparian habitats, and wetlands as described under Water Resources and Geochemistry, Vegetation, and other Terrestrial Wildlife measures. • To improve off-site sage grouse habitat, establish funds for habitat rehabilitation from past wildfire effects for native sagebrush lands. The amount of this fund would be negotiated between the BLM and Barrick. • Improvement of habitat in Squaw Valley Allotment (also being considered for cumulative effects mitigation).
American White Pelican, Osprey					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• No impacts to lakes or reservoirs anticipated for both species. Short-term increase in potential foraging habitat along Humboldt River for osprey. Potential exposure to constituents of concern at Humboldt Sink for both species.	• Continue aquatic biota monitoring study along Humboldt River and at Humboldt Sink, in cooperation with USFWS.
White-Faced Ibis, Black Tern					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• Long-term, incremental reduction in potential foraging and nesting habitat. Short-term increase in potential foraging habitat along Humboldt River. Potential exposure to constituents of concern at Humboldt Sink.	• Monitoring and mitigation of perennial streams, riparian habitats, and wetlands as described under Water Resources and Geochemistry, and Vegetation, and other Terrestrial Wildlife measures. • Continue aquatic biota monitoring study along Humboldt River and at Humboldt Sink, in cooperation with USFWS.
				• As mine dewatering ends and soils dry in Boulder Valley, increased leaching of minerals and salts into the soil surface and subsurface layers, modifying associated plant communities.	• None

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
Nevada Viceroy					
• See general discussion for Terrestrial Special Status Species above.	• See general discussion for Terrestrial Special Status Species above.			• Possible effects to potential habitat for Nevada viceroy.	• Monitoring and mitigation of perennial streams, riparian habitats, and wetlands as described under Water Resources and Geochemistry, and Vegetation, and other Terrestrial Wildlife measures.
AQUATIC SPECIAL STATUS SPECIES					
• No effects on aquatic species were identified.	• None	• No effects on aquatic species were identified.	• Barrick shall expand their network of monitoring surface water elevations in streams inhabited by LCT. • Additional mitigation could be implemented for LCT, if a review of ground water data indicates effects on flows in streams inhabited by LCT. • If monitoring data indicate that drawdown is expanding into streams inhabited by LCT, Barrick shall use reinjection wells to recharge the ground water system.	• Potential reductions in potential habitat for the spotted frog in upper Antelope Creek.	• Monitor flows in upper Antelope Creek (see measures described for Water Resources and Geochemistry). If flow reductions occur compared to baseflow conditions, BLM would determine the need for mitigation. Mitigation could involve off-site enhancement in the Squaw Valley Allotment (same as native fishes).
				• Potential reductions in habitat and loss of individuals for springsnails in upper Antelope Creek and Squaw Creek.	• Conduct an inventory of springsnails in suitable habitat within previously unsurveyed seeps and springs in the potential impact area. • Monitor flows in upper Antelope Creek and Squaw Creek (see Water Resources and Geochemistry). If reductions in flow or water levels occur compared to baseline conditions, BLM would determine the need for mitigation. Mitigation could involve flow augmentation, relocation of individuals, on-site enhancement, and off-site enhancement (fencing around seeps and springs).

Betze Project EIS (1991)		Meikle Mine EA/BA (1994)		Betze Project Supplemental EIS	
Impacts	**Monitoring/Mitigation**	**Impacts**	**Monitoring/Mitigation**	**Impacts**	**Monitoring/ Mitigation**
GRAZING MANAGEMENT					
• Potential flow reductions in seeps and springs could result in a loss of 345 acres of grazing land.	• Provide funds for acquisition and maintenance of alternative water sources (e.g., guzzlers, cisterns, purchase water rights, etc.) (maximum of $50,000).			• Possible effects on water sources in the Twenty-five and T Lazy S allotments.	• Continued annual monitoring of flows and water levels in representative seeps and springs within drawdown area. • If water sources are lost, Barrick would make arrangements with BLM and landowners to replace water.
SOCIOECONOMICS					
• No anticipated impact.	• None	• No anticipated impact.	• None	• In unlikely event of Humboldt River discharge, minor increase in available irrigation water. • Possible effects on grazing water sources. • Possible effects to hunting and fishing activities.	• None • See Grazing Management • None
NATIVE AMERICAN RELIGIOUS CONCERNS					
• No anticipated impact.	• None	• No anticipated impact.	• None	• No anticipated impact.	• Consultation still in progress. Mitigation to be proposed if appropriate.

[1]These measures may no longer be enforceable as the land associated with the Meikle Mine is no longer administered by the Bureau of Land Management.

Table S-2
Summary of Impacts and Monitoring/Mitigation for Proposed Action (Buried Pipeline)

Impacts	Monitoring/ Mitigation Measures
GEOLOGY	
• No anticipated impact.	• None
WATER RESOURCES AND GEOCHEMISTRY	
• No anticipated impact.	• None
VEGETATION (INCLUDING RIPARIAN)	
• Pipeline construction would temporarily impact 18 acres of big sagebrush/grassland vegetation. • Potential invasion of cheatgrass and halogeton in construction ROW.	• Reclamation and reseeding of disturbed area and continued noxious weed control.
TERRESTRIAL WILDLIFE	
• Temporary disturbance to 18 acres of big sagebrush/ grassland habitats.	• Reclamation of disturbed area by reseeding. Barrick's committed reclamation plan is in place; no additional monitoring or mitigation measures are proposed.
• Short-term animal displacement and possible loss of less mobile species (e.g., ground-nesting birds, small mammals, reptiles) from pipeline construction; however, no population-level effects anticipated. Loss of an active nest site would violate the Migratory Bird Treaty Act.	• Nest surveys or construction scheduling to avoid impacts to nesting birds. See Burrowing Owl under Terrestrial Special Status Species.
AQUATIC RESOURCES	
• No anticipated impact.	• None
TERRESTRIAL SPECIAL STATUS SPECIES	
• Note: Potential impacts to special status species from the Proposed Action are discussed below for each species.	• See below for applicable measures.
Preble's Shrew (if present)	
• Short-term reduction in potential habitat.	• None
Long-eared Myotis, Small-footed Myotis, Spotted Bat	
• No anticipated impact.	• None
Long-legged Myotis, Fringed Myotis, Townsend's Big-eared Bat	
• Short-term reduction in potential foraging habitat.	• None
Bald Eagle, Golden Eagle, Swainson's Hawk, Ferruginous Hawk	
All Four Raptor Species: • Short-term reduction in potential upland foraging habitat.	• None
Northern Goshawk	
• No anticipated impact.	• None

Impacts	Monitoring/ Mitigation Measures
Burrowing Owl	
• Potential direct and indirect impacts to breeding adults, eggs, or young; short-term reduction in potential foraging habitat.	• If pipeline construction were to occur from March through August, a clearance survey would be conducted within 0.25 mile of the ROW for potentially active burrowing owl nests. If active nests were observed, Barrick would coordinate with the BLM to determine if protection measures are warranted (e.g., buffer area, constraint period, artificial nesting burrows, etc.). This determination would be based on variables, including breeding phenology, nest location, and type of construction activity.
Sage Grouse	
• Short-term reduction in potential breeding habitat.	• None
American White Pelican, Osprey	
• No anticipated impact.	• None
White-Faced Ibis, Black Tern	
• No anticipated impact.	• None
Nevada Viceroy	
• No anticipated impact.	• None
AQUATIC SPECIAL STATUS SPECIES	
• No ancitipated impact.	• None
GRAZING MANAGEMENT	
• Temporary loss of forage for livestock associated with 18 acres within the T Lazy S Allotment.	• Reclaim disturbed areas by reseeding.
AIR RESOURCES	
• Minor amounts of fugitive dust would be produced during the 2-week construction period.	• None
TOPOGRAPHY AND SOILS	
• No anticipated impact.	• None
LAND USE AND ACCESS	
• Increased irrigation water by approximately 8,000 gpm. • In-place pipeline abandonment would encumber lands.	• None • None
CULTURAL RESOURCES	
• No impacts to known cultural sites. • Potential disturbance to unknown cultural sites in unsurveyed area.	• All previously unsurveyed sites would be examined prior to construction. Appropriate data recovery would be used for any identified sites in the ROW.
NATIVE AMERICAN RELIGIOUS CONCERNS	
• No anticipated impact.	• None
NOISE AND VISUAL RESOURCES	
• No exceedence of noise standards at sensitive receptors.	• None
• Reclamation of disturbed ROW would result in compatibility with VRM objectives.	• None